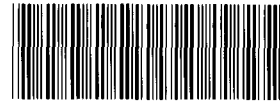


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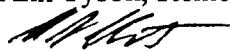
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## INTEROFFICE CORRESPONDENCE

DATE: September 5, 1995

TO: Ann Tyson, Remediation Manager, Accelerated Actions Group

FROM:   
Rick Roberts, Technical Support, Remediation Services, X8508  
FAX# 966-8556, Cubicle #315


SUBJECT: TRENCH T-2 RISK ASSESSMENT FOR VOC EMISSIONS DURING  
EXCAVATION ACTIVITIES - RSR-003-95

ACTION: None

Attached is the "Trench T-2 Risk Assessment For VOC Emissions During Excavation Activities."  
This risk assessment shows that there is acceptable risk to an individual not actually involved in  
excavation activities at Trench T-2. A report on the air emission calculations will be transmitted  
to you by Grant Euler of the air programs group by September 7.

If you have any questions, please call.

Distribution:

Win Chromec   
Grant Euler  
Susan Evans  
John Hopkins  
Zeke Houk  
Document Control (2)



ADMIN RECCRD

BZ-A-000342

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## TRENCH T-2 RISK ASSESSMENT FOR VOC EMISSIONS DURING EXCAVATION ACTIVITIES

### Introduction

A human health risk assessment was performed to assess the risks to members of the public during the excavation of contaminated soils at Trench T-2. This risk assessment will be used to assess the risks to individuals that may be using roads near Trench T-2 during excavation activities. Risks were assessed for volatile organic compounds only due to their potential to become airborne during excavation activities. The results of this risk assessment showed that the risks to an individual northwest of Trench T-2 at the decontamination pad road are within the acceptable risk range. This location will give the highest risk to an individual not actually involved in excavation activities.

### Methodology

Human health risks were calculated at the following locations to assure that the risks to an individual not actually involved in excavation activities were well characterized.

- \* At the closest roadway, northwest of Trench T-2 at the decontamination pad road (78 Meters),
- \* At the next closest roadway, north of Trench T-2 at Central Avenue (212 Meters), and
- \* At the East Guard Shack (2182 Meters).

Exposure point concentrations were calculated using EPA's SCREEN model along with Estimation of Air Impacts for the Excavation of Contaminated Soil, (EPA-450/1-92-004). Exposure point concentrations were modeled using two separate trench volumes; a small area volume and a large area volume. A small area of Trench T-2 showed concentrations of volatiles much higher than the surrounding trench area. Therefore, the small area with higher concentrations of volatiles was modeled separately from the larger volume of Trench T-2. The small area volume is 75 ft<sup>3</sup> and the large area volume is 1200 ft<sup>3</sup>. Concentrations of volatiles and volume estimates are based on characterization data. Exposure point concentrations in air were calculated assuming that the volatile compounds were present at the exposure point for 0.014 and 0.225 hour for the small and large area sources, respectively. Exposure times are based on the EPA guidance document which states that 0.042 cubic meters of material are excavated per second. The volatile constituents 2-Butanone, 4-Methyl-2-Pentanone, Chloroethane, Chloroform, 1,1-Dichloroethane, 1,2-Dichloroethane, Ethylbenzene, Methylene Chloride, Toluene, tetrachloroethylene (PCE) and trichloroethylene (TCE) were modeled.

Human health risks were calculated for both the small area and large area sources for all volatiles. Inhalation exposure only was assessed for the duration of VOC emissions at the site. Human health risks were calculated based on Risk Assessment Guidance For Superfund, Volume I, Human Health

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Evaluation Manual (Part A), (EPA/540/1-89/002). Chloroform, 1,2-Dichloroethane, Methylene Chloride, PCE and TCE had published inhalation slope factors from IRIS and HEAST. 2-Butanone, 4-Methyl-2-Pentanone, Chloroethane, 1,1-Dichloroethane, Ethylbenzene, Methylene Chloride and Toluene had published inhalation reference doses from IRIS and HEAST. To be conservative, chronic inhalation reference doses were used instead of subchronic values. Risks from other volatile compounds could not be calculated since no toxicity factors are currently published.

## Results

The risk calculations show that the risks posed by the excavation are within the acceptable range for an individual not actually involved in excavation activities. This conclusion is based on examining both the small area and large area sources. The highest carcinogenic risk at the decontamination pad road is  $2.7E-09$  which is well below the acceptable risk range of  $1E-04$  to  $1E-06$ . The highest non-carcinogenic risk at the decontamination pad road is  $1.6E-04$  which is well below the acceptable threshold chronic hazard index of 1.0. Therefore, there are no unacceptable risks posed by the Trench T-2 excavation to an individual not actually involved in excavation activities.

## Tables

Table 1 - Trench T-2 VOC Inhalation Risk Summary

Table 2 - VOC Inhalation Risk, T-2 Trench to the Decontamination Pad (78 Meters)

Table 3 - VOC Inhalation Risk, T-2 Trench to Central Avenue (212 Meters)

Table 4 - VOC Inhalation Risk, T-2 Trench to the East Guard Shack (2182 Meters)

**TABLE 1**  
**TRENCH T-2 VOC INHALATION RISK SUMMARY**

	Small Area Exposure		Large Area Exposure	
	Cancer Risk	Chronic Hazard Index	Cancer Risk	Chronic Hazard Index
<u>Media\Pathway</u>				
<u>Subsurface Soil\VOC Inhalation</u>				
T-2 Trench to Decon Pad	7.5E-10	1.6E-04	2.7E-09	5.6E-05
T-2 Trench to Central Avenue	1.7E-10	3.4E-05	5.9E-10	1.2E-05
T-2 Trench to East Guard Shack	4.3E-12	9.0E-07	1.5E-11	3.2E-07

**TABLE 2**  
**VOC INHALATION RISK**  
**T-2 TRENCH TO THE DECONTAMINATION PAD (78 METERS)**

**INHALATION EXPOSURE FACTORS**

Exposure Factor Description	Exposure Factor Units	Adult Exposure Value
Inhalation Rate (IR)	m <sup>3</sup> /hr	0.83
Small Area Exposure Time (SET)	hours	0.014
Large Area Exposure Time (LET)	hours	0.225
Body Weight (BW)	kg	70
Carcinogenic Averaging Time (AT)	days	25550
Non-Carcinogenic Averaging Time (AT)	days	365

**CARCINOGENIC RISK (SMALL AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Slope Factor (mg/kg/day) <sup>01</sup>	Carcinogenic Risk
Methylene Chloride	1.47	6.5E-09	9.6E-09	1.64E-03	1.6E-11
1,2-Dichloroethane	1.04	6.5E-09	6.8E-09	9.10E-02	6.1E-10
Tetrachloroethylene	3.74	6.5E-09	2.4E-08	2.03E-03	4.9E-11
Trichloroethylene	1.79	6.5E-09	1.2E-08	5.95E-03	6.9E-11
TOTAL					7.5E-10

**CARCINOGENIC RISK (LARGE AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Slope Factor (mg/kg/day) <sup>01</sup>	Carcinogenic Risk
Chloroform	0.113	1.0E-07	1.2E-08	8.05E-02	9.5E-10
Methylene Chloride	0.032	1.0E-07	3.3E-09	1.64E-03	5.5E-12
Tetrachloroethylene	2.38	1.0E-07	2.5E-07	2.03E-03	5.0E-10
Trichloroethylene	1.93	1.0E-07	2.0E-07	5.95E-03	1.2E-09
TOTAL					2.7E-09

**NON-CARCINOGENIC RISK (SMALL AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Hazard Quotient
4-Methyl-2-Pentanone	6.35	4.5E-07	2.9E-06	2.24E-02	1.3E-04
Ethylbenzene	3.03	4.5E-07	1.4E-06	2.86E-01	4.8E-06
Methylene Chloride	1.47	4.5E-07	6.7E-07	8.57E-01	7.8E-07
1,1-Dichloroethane	2.01	4.5E-07	9.1E-07	1.43E-01	6.4E-06
Toluene	4.41	4.5E-07	2.0E-06	1.14E-01	1.8E-05
HAZARD INDEX					1.6E-04

**NON-CARCINOGENIC RISK (LARGE AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Hazard Quotient
2-Butanone	0.066	7.3E-06	4.8E-07	2.86E-01	1.7E-06
4-Methyl-2-Pentanone	0.097	7.3E-06	7.1E-07	2.24E-02	3.2E-05
Chloroethane	0.027	7.3E-06	2.0E-07	2.86E+00	6.9E-08
Ethylbenzene	0.308	7.3E-06	2.3E-06	2.86E-01	7.9E-06
Methylene Chloride	0.032	7.3E-06	2.3E-07	8.57E-01	2.7E-07
Toluene	0.227	7.3E-06	1.7E-06	1.14E-01	1.5E-05
HAZARD INDEX					5.6E-05

**TABLE 3**  
**VOC INHALATION RISK**  
**T-2 TRENCH TO CENTRAL AVENUE (212 METERS)**

**INHALATION EXPOSURE FACTORS**

Exposure Factor Description	Exposure Factor Units	Adult Exposure Value
Inhalation Rate (IR)	m <sup>3</sup> /hr	0.83
Small Area Exposure Time (SET)	hours	0.014
Large Area Exposure Time (LET)	hours	0.225
Body Weight (BW)	kg	70
Carcinogenic Averaging Time (AT)	days	25550
Non-Carcinogenic Averaging Time (AT)	days	365

**CARCINOGENIC RISK (SMALL AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Slope Factor (mg/kg/day) <sup>-01</sup>	Carcinogenic Risk
Methylene Chloride	0.323	6.5E-09	2.1E-09	1.64E-03	3.4E-12
1,2-Dichloroethane	0.23	6.5E-09	1.5E-09	9.10E-02	1.4E-10
Tetrachloroethylene	0.823	6.5E-09	5.3E-09	2.03E-03	1.1E-11
Trichloroethylene	0.394	6.5E-09	2.6E-09	5.95E-03	1.5E-11
TOTAL					1.7E-10

**CARCINOGENIC RISK (LARGE AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Slope Factor (mg/kg/day) <sup>-01</sup>	Carcinogenic Risk
Chloroform	0.025	1.0E-07	2.6E-09	8.05E-02	2.1E-10
Methylene Chloride	0.007	1.0E-07	7.3E-10	1.64E-03	1.2E-12
Tetrachloroethylene	0.524	1.0E-07	5.5E-08	2.03E-03	1.1E-10
Trichloroethylene	0.424	1.0E-07	4.4E-08	5.95E-03	2.6E-10
TOTAL					5.9E-10

**NON-CARCINOGENIC RISK (SMALL AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Hazard Quotient
4-Methyl-2-Pentanone	1.4	4.5E-07	6.4E-07	2.24E-02	2.8E-05
Ethylbenzene	0.667	4.5E-07	3.0E-07	2.86E-01	1.1E-06
Methylene Chloride	0.324	4.5E-07	1.5E-07	8.57E-01	1.7E-07
1,1-Dichloroethane	0.442	4.5E-07	2.0E-07	1.43E-01	1.4E-06
Toluene	0.97	4.5E-07	4.4E-07	1.14E-01	3.9E-06
HAZARD INDEX					3.5E-05

**NON-CARCINOGENIC RISK (LARGE AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Hazard Quotient
2-Butanone	0.015	7.3E-06	1.1E-07	2.86E-01	3.8E-07
4-Methyl-2-Pentanone	0.021	7.3E-06	1.5E-07	2.24E-02	6.9E-06
Chloroethane	0.006	7.3E-06	4.4E-08	2.86E+00	1.5E-08
Ethylbenzene	0.068	7.3E-06	5.0E-07	2.86E-01	1.7E-06
Methylene Chloride	0.007	7.3E-06	5.1E-08	8.57E-01	6.0E-08
Toluene	0.05	7.3E-06	3.7E-07	1.14E-01	3.2E-06
HAZARD INDEX					1.2E-05

**TABLE 4**  
**VOC INHALATION RISK**  
**T-2 TRENCH TO THE EAST GUARD SHACK (2182 METERS)**

**INHALATION EXPOSURE FACTORS**

Exposure Factor Description	Exposure Factor Units	Adult Exposure Value
Inhalation Rate (IR)	m <sup>3</sup> /yr	0.83
Small Area Exposure Time (SET)	hours	0.014
Large Area Exposure Time (LET)	hours	0.225
Body Weight (BW)	kg	70
Carcinogenic Averaging Time (AT)	days	25550
Non-Carcinogenic Averaging Time (AT)	days	365

**CARCINOGENIC RISK (SMALL AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Slope Factor (mg/kg/day) <sup>01</sup>	Carcinogenic Risk
Methylene Chloride	0.008	6.5E-09	5.2E-11	1.64E-03	8.5E-14
1,2-Dichloroethane	0.006	6.5E-09	3.9E-11	9.10E-02	3.5E-12
Tetrachloroethylene	0.021	6.5E-09	1.4E-10	2.03E-03	2.8E-13
Trichloroethylene	0.01	6.5E-09	6.5E-11	5.95E-03	3.9E-13
TOTAL					4.3E-12

**CARCINOGENIC RISK (LARGE AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Slope Factor (mg/kg/day) <sup>01</sup>	Carcinogenic Risk
Chloroform	0.0006	1.0E-07	6.3E-11	8.05E-02	5.0E-12
Methylene Chloride	0.0002	1.0E-07	2.1E-11	1.64E-03	3.4E-14
Tetrachloroethylene	0.014	1.0E-07	1.5E-09	2.03E-03	3.0E-12
Trichloroethylene	0.011	1.0E-07	1.1E-09	5.95E-03	6.8E-12
TOTAL					1.5E-11

**NON-CARCINOGENIC RISK (SMALL AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Hazard Quotient
4-Methyl-2-Pentanone	0.036	4.5E-07	1.6E-08	2.24E-02	7.3E-07
Ethylbenzene	0.017	4.5E-07	7.7E-09	2.86E-01	2.7E-08
Methylene Chloride	0.008	4.5E-07	3.6E-09	8.57E-01	4.2E-09
1,1-Dichloroethane	0.011	4.5E-07	5.0E-09	1.43E-01	3.5E-08
Toluene	0.025	4.5E-07	1.1E-08	1.14E-01	1.0E-07
HAZARD INDEX					9.0E-07

**NON-CARCINOGENIC RISK (LARGE AREA)**

Chemical	Chemical Concentration (mg/m <sup>3</sup> )	Intake Factor (m <sup>3</sup> /kg/day)	Intake (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)	Hazard Quotient
2-Butanone	0.0004	7.3E-06	2.9E-09	2.86E-01	1.0E-08
4-Methyl-2-Pentanone	0.0006	7.3E-06	4.4E-09	2.24E-02	2.0E-07
Chloroethane	0.0002	7.3E-06	1.5E-09	2.86E+00	5.1E-10
Ethylbenzene	0.002	7.3E-06	1.5E-08	2.86E-01	5.1E-08
Methylene Chloride	0.0002	7.3E-06	1.5E-09	8.57E-01	1.7E-09
Toluene	0.001	7.3E-06	7.3E-09	1.14E-01	6.4E-08
HAZARD INDEX					3.2E-07